

Credit Expansion and Misallocation

Yuanchen Yang¹ and Yangyang Liu²

Abstract

In response to the global financial crisis in 2008, the Chinese government launched a 4-trillion-yuan economic stimulus plan, which represented a typical episode of government intervention in the economy. This paper analyzed the impact of the stimulus plan, which mainly took the form of bank credit lines, on resource allocation and aggregate productivity. Using manufacturing data from 2001 to 2013, we showed empirically that it pulled up the total demand in the short term, but by extending excessive credit to weak firms, it created resource misallocation and over-capacity in the long term. This effect was observed after a lag of 3 years and was especially pronounced in resource-based industries. The results carried strong implications for emerging economies that undertook similar stimulus plans and whose financial markets have been plagued by severe frictions.

JEL classification numbers: G01, G21, G28

Keywords: Bank credit, Corporate governance, Financial crisis

¹ People's Bank of China School of Finance, Tsinghua University.

² Harvest Fund.

1. Introduction

The financial crisis that swept over the world in 2008 has brought extremely severe negative shocks to the Chinese economy. In 2008, the Chinese government introduced a total of 4-trillion-yuan stimulus policies to tackle the financial crisis, of which 1.8 trillion yuan came from the central government, and the rest was local government spending and bank credit lines. It represented the largest economic stimulus in China over the past decade.

The impact of the Chinese government's countercyclical credit expansion during the financial crisis has been controversial. Proponents believe that this policy has exerted a positive effect and helped the Chinese economy avoid a severe recession in 2009 and 2010. Opponents believe that this economic stimulus plan has exacerbated the existing over-investment problem, which has further reduced the efficiency of resource allocation and created a long-term negative impact on the economy (Zoellick and Lin, 2009; Bai and Zhang, 2014).

This paper sets out to analyze the impact of China's credit expansion on resource misallocation during the financial crisis. The difficulty of the study lies in two aspects. On the one hand, the economic downturn in China's various industries after 2010 was a widespread phenomenon, and meanwhile the global economy also slipped into recession, it is thus difficult to conclude outright that China's recession was caused by countercyclical economic stimulus. On the other hand, overcapacity was concentrated in cyclical industries, such as ferrous and non-ferrous metal smelting, ocean-going vessels, coal, etc. This group of industries had performed poorly during the economic downturn. To analyze the role of economic stimulus in resource misallocation, it is necessary to carefully distinguish cyclical factors from policy factors.

The main contribution of this paper is at least threefold.

First, this paper provides a relatively thorough exploration into the impact of policy intervention on China's resource misallocation in the 14 years before and after the financial crisis (2001-2013) from an empirical perspective. Previous studies failed to account for the full picture of financial crisis, policy intervention, and resource misallocation, often leading to conflicting conclusions. Specifically, some studies found that policy intervention exacerbated China's resource misallocation, but others, which focused on the profitability of Chinese firms or industries during 2001-2007, found that resource misallocation did not increase. In fact, the current study finds that policy support was indeed beneficial to the development of supported firms or industries for a certain period of time, but when economic uncertainty increased, the government's multiple goals and goal of profit maximization of supported firms and industries would come into conflict. In this scenario, policy support would hamper economic development and thus exacerbate resource misallocation. Without adequate analysis of the economic background, investigation into the relationship between policy intervention and resource misallocation alone would be incomplete.

Second, scholars agreed that governments hold distinct attitudes towards different industries, and they also acknowledged that some industries, such as infrastructure construction, are supported by the government, while others receive little or no support. However, identifying the degree of support for various industries proves to be difficult, and this study fills the gap by quantifying the degree of government support at the industry level. Since the global financial crisis, the 4-trillion-yuan stimulus plan has been questioned continuously, but there have been few, if any, rigorous empirical analyses on its effect. This was partly limited by data, partly because China and the global economy have not yet recovered from the financial crisis. By exploiting a Chinese manufacturing dataset from 2001 to 2013, this paper spans a 14-year time period before and after the financial crisis, which is long enough for the complete effect of policy intervention to materialize.

More importantly, the impact of policy intervention on the problem of overcapacity may not be direct. After the financial crisis, industries such as steel, coal, and non-ferrous metals did not receive much policy support and credit injection, but these industries continued to present

serious overcapacity problems after 2010. Some scholars believe that this is a natural phenomenon due to the economic cycle. However, using the input-output table, this paper finds that indirect investment in infrastructure projects has significantly increased the fluctuation of demand in these industries, making these industries perform better during the economic boom, but fared even worse during the recession. In this sense, policy support has an indirect but significant impact on overcapacity, and the discussion of this hidden effect of policy intervention is almost absent in existing literature.

2. Literature Review

Literature has yet to reach a consensus on the definition of resource misallocation. Hsieh and Klenow (2009) focused on statics, and defined resource misallocation as the inequality of marginal output of each firm based on the principle of equal marginal returns of factors. Due to the law of diminishing marginal returns, this misallocation would lower the overall total factor productivity. They found that if the allocation of capital and labor between industries in China and India is equal to that in the United States, the overall total factor productivity of the economy can be increased by 25-40% in China and 50-60% in India, respectively. Restuccia and Rogerson (2013) focus on the dynamics, and decomposed production factors into concrete elements such as capital and labor, and abstract elements such as knowledge, technology, and institutions. If the flow of concrete and abstract elements is out of sync, the misallocation will occur.

In addition to exploring the effect of resource misallocation on economic growth, there have been many studies focusing on the sources of resource misallocation. Contributing factors including credit constraints, trade barriers, and policy intervention have been identified. Moll (2014) linked economic growth with financial market reforms, and found that when credit constraints exist, highly productive firms have difficulty borrowing and their allocated capital is lower than the optimal level. Meanwhile firms with low productivity accumulate excessive capital. If this cross-industry misallocation occurs, there will be overcapacity in low-productivity industries. Despite the distinct focuses of various studies devoted to credit constraints (Banerjee and Duflo, 2005; Buera et al., 2011; Midrigan and Xu, 2014), they basically agreed that credit constraints are the main cause of resource misallocation.

Trade barriers constitute one of the major sources of resource misallocation across countries. Pavcnik (2002) researched on Chile's trade liberalization, and found that lifting trade barriers can greatly increase corporate productivity and reduce the dispersion of productivity, mainly due to increased competition in the import sector. Alcalá and Ciccone (2004) summarized previous research on trade and labor productivity, suggesting that previous results failed to reach robust conclusions, and their cross-country comparisons yielded reliable results. Furthermore, they explored how trade and institutional improvements can increase labor productivity, and showed that trade can improve workers' productivity; whereas institutional improvements can increase the rate of capital accumulation.

Policy intervention is another factor that influences resource misallocation. Hopenhayn and Rogerson (1993) constructed a general equilibrium model, used a calibrated method to calculate the impact of tax rate differences between firms on labor misallocation, and found that setting a reasonable tax rate can increase TFP by 5%. Lagos (2006) found that unemployment insurance and employment policy can affect firm TFP through selection effects. Guner et al. (2008) found that the government's control of the firm size will distort the allocation of resources. Their research on some EU countries (Germany, France, the United Kingdom, etc.) showed that a 20% reduction in average firm size due to policy restrictions is associated with a 8.1% -25.6% fall in total output.

The framework of resource misallocation can lead to a discussion of excess capacity. If factor allocation is effective, then there should be a market clearing under equilibrium, and neither

overcapacity nor insufficient output would occur. However, when resource misallocation occurs at the industry level, excessive input of elements in certain industries signals a form of resource misallocation, and excessive allocation means that the industry's capacity exceeds the capacity under perfect competition. The correlation between resource misallocation and excess capacity proves to be higher in the manufacturing sector.

3. Data and Methodology

3.1 Data sources

This paper uses industry-level statistics from the Chinese manufacturing sector during 2001 and 2013. Since China's industry-level statistical indicators before 2001 were too broad, and the standards of aggregation were different from those after 2001, this paper excluded the sample before 2001 for the sake of simplicity. Based on the 2011 two-digit industry classification, the final sample ended up with a total of 39 industries, ranging from mining, manufacturing, to electricity, gas, and water supply. The industry-level data used in this paper were extracted from the China Industrial Economic Statistical Yearbook, China Labor Statistics Yearbook, and 2010 census data. Fixed asset input, labor force, intermediate input, and wages were computed after adjustment based on the yearbook data.

3.2 Summary statistics

The following table shows the trends of the main economic indicators of various industries from 2005 to 2013. For each row, mean value is in the upper bracket, and standard deviation is in the lower bracket. The total output of various industries has been steadily increasing, but the average total output growth during 2007 and 2009 was very small. In terms of net fixed assets, growth was the largest in 2009. The average employment in 2009 experienced a significant increase, but the increase has been slower since 2011, and even slightly decreased in 2013. The change in the intermediate input is similar to the net value of fixed assets. Both of them reached a peak growth rate in 2009, and the growth rate in other years has been relatively fast. The increase in labor income is also large. In 2009, the increase in labor income of employees in various industries slowed down slightly, but the impact was much smaller than other variables such as output. Taken together, 2009 was clearly a turning point. The production inputs and outputs of various industries were more or less affected by the financial crisis, but this impact did not have a sustained negative effect. The figures picked up in varying degrees during subsequent years.

Table 1: Description Statistics of Basic Variables

	2005	2007	2009	2011	2013
Total output	6372.92	10249.20	13910.80	21585.40	24898.00
	(1034.18)	(1615.5)	(2108.39)	(3226.16)	(3632.26)
Value added	1667.52	2543.42	3185.14	4185.60	5053.48
	(244.81)	(355.57)	(434.45)	(562.85)	(676.924)
Net fixed assets value	2379.55	3310.86	4603.77	5866.01	6966.64
	(596.625)	(857.85)	(1150.4)	(1399.66)	(1590.25)
Current depreciation	243.56	349.61	408.96	578.93	685.54
	(55.36)	(78.5)	(71.22)	(123.26)	(140.18)
Number of employees	176.82	201.93	226.44	235.06	234.29
	(23.83)	(27.31)	(30.42)	(32.85)	(32.32)
Intermediate input	4408.63	7060.83	9687.66	15195.11	17535.96
	(799.63)	(1229.18)	(1602.10)	(2466.74)	(2764.76)
Average salary (yuan)	14906.70	22112.00	27985.50	38531.40	49361.20
	(825.254)	(1230.42)	(1592.64)	(1974)	(2274.58)
Average years of education	10.14	10.14	10.14	10.14	10.14
	(0.169)	(0.169)	(0.169)	(0.169)	(0.169)

Note: Unless otherwise specified, the units are 100 million yuan.

Data source: China Industrial Economic Statistical Yearbook, China Labor Statistics Yearbook, 2010 Census data

3.3 Calculation of supported degree

One of the major difficulties of this study is to measure the ease with which each industry can obtain policy support, as there is no direct data on which industries directly benefit from this credit expansion program. We adopt a textual analysis method, using a series of State Council and Development and Reform Commission documents from the end of 2008 to mid-2009 to identify industry preferences for credit expansion programs. For example, the report of the State Council Executive Meeting (2008) showed that the hydropower industry and the transportation industry, which includes roads, railways, and airports, are expressly supported industries. In addition, the author also relied on the 2008 and 2009 annual reports of China's major commercial banks to determine whether these industry preferences have indeed been implemented. In the end, we sorted out 13 industries that were clearly supported by favorable credit policies, and labeled them the policy support group. The remaining 26 industries were assigned to the control group.

Table 2: Identification of Supported Industries

Name of Supported Industry	Code	Source
Agriculture, forestry, husbandry, fishery-forestry	2	Minutes of the State Council Executive Meeting on November 5, 2008
Mining-oil and gas extraction	7	May 18, 2009 Petrochemical Industry Adjustment and Revitalization Plan of the National Development and Reform Commission
Mining-mining and dressing of ferrous metals	8	March 23, 2009 Steel Industry Adjustment and Revitalization Plan of the National Development and Reform Commission
Mining-nonferrous metal ore mining and dressing Industry	9	May 12, 2009 National Non-ferrous Metal Industry Adjustment and Revitalization Plan of the National Development and Reform Commission
Manufacturing-petroleum processing, coking and nuclear fuel processing	25	May 18, 2009 Petrochemical Industry Adjustment and Revitalization Plan of the National Development and Reform Commission
Manufacturing-ferrous metal smelting and dressing	31	March 23, 2009 Steel Industry Adjustment and Revitalization Plan of the National Development and Reform Commission
Manufacturing-nonferrous metal smelting and dressing	32	March 23, 2009 Steel Industry Adjustment and Revitalization Plan of the National Development and Reform Commission
Manufacturing-metal products	33	May 12, 2009 National Non-ferrous Metal Industry Adjustment and Revitalization Plan of the National Development and Reform Commission
Manufacturing-automotive	36	March 23, 2009 Automotive Industry Adjustment and Revitalization Plan of the National Development and Reform Commission
Manufacturing-railway, ship, aerospace and other transportation equipment manufacturing	37	Minutes of the State Council Executive Meeting on November 5, 2008
Manufacturing-electrical machinery and equipment manufacturing	38	Minutes of the State Council Executive Meeting on November 5, 2008
Electricity, heat production and supply	44	Minutes of the State Council Executive Meeting on November 5, 2008
Water production and supply	46	Minutes of the State Council Executive Meeting on November 5, 2008
Comprehensive utilization of waste Resources	42	Minutes of the State Council Executive Meeting on November 5, 2008
Road transportation	54	Minutes of the State Council Executive Meeting on November 5, 2008
Water transportation	55	June 29, 2009 National Shipbuilding Industry Adjustment and Revitalization Plan
Air transportation	56	Minutes of the State Council Executive Meeting on November 5, 2008
Loading, unloading and transportation agency	58	April 24, 2009 National Logistics Planning and Adjustment Plan for Logistics Industry
Warehousing	59	April 24, 2009 National Logistics Planning and Adjustment Plan for Logistics Industry

3.4 Calculation of relative capital distortion factor

Table 3 shows the relative capital distortion factor before and after credit expansion. The data show that the majority of the industries supported by favorable bank credit lines have the same problem after 2009, that is, the capital distortion factor increased sharply, while the unsupported industries have the same or declining capital distortion factor. Among the industries in the policy support group, the increase in capital distortion in the electricity, heat production and supply industry was the most severe, jumping from 2.654 in 2007 to 4.844 in 2009. Although it fell in the subsequent years, it was also higher than the pre-crisis level until 2013. In addition, the distortion of ferrous metal smelting and dressing industry and nonferrous metal smelting and dressing industry is also quite costly.

Judging from the overall condition of the two groups, we can see that most of the industries that were prioritized by credit policies during the financial crisis had excess capital allocation, while the capital allocation of other industries was relatively in short supply. The counter-cyclical credit expansion that began at the end of 2008 was significantly over-provisioned to credit prioritized industries, manifested by the relative distortion of the average capital element of the policy support group (from 1.796 to 2.380), while the capital distortion factor of the control group has decreased. (From 1.145 to 1.047). However, this transient credit expansion did not produce a sustained distortion effect. The relative distortion factor of the credit prioritized group has decreased since 2009, while the relative distortion factor of the control group has continued to increase, so the gap between the two groups has gradually closed. This indicates that the spontaneous adjustment of the economy will push part of the excess capital to flow from the policy support group to the control group. This spontaneous mitigation reduces the degree of capital distortion caused by the unbalanced credit expansion.

Table 3: Relative Capital Distortion Factor Before and After the Credit Expansion in 2008-2009

Industry	Credit Priority	2003	2005	2007	2009	2011	2013
Electricity, heat production and supply	Yes	2.238	2.666	2.654	4.844	3.795	2.704
Ferrous metal smelting and dressing	Yes	1.197	1.457	1.447	1.849	2.144	2.199
Chemical raw materials and chemical products manufacturing	No	1.380	1.404	1.286	1.289	1.309	1.439
Computer, communications and other electronic equipment manufacturing	No	0.984	1.469	1.539	1.257	1.154	0.973
Coal mining and coking	No	1.220	0.748	0.780	0.723	0.755	1.045
Electrical machinery and equipment manufacturing	Yes	0.771	0.979	0.851	0.688	0.796	0.753
Non-metallic mineral products	No	1.300	1.716	1.247	1.097	1.083	1.099
General Equipment Manufacturing	No	0.879	0.960	0.873	0.869	0.793	0.689
Non-ferrous metal smelting and dressing	Yes	1.636	1.579	1.032	1.256	1.331	1.542
Water production and supply	Yes	3.429	3.293	2.996	3.265	3.279	2.999
Average of credit prioritized industries		1.854	1.995	1.796	2.380	2.269	2.039
Average of control industries		1.153	1.259	1.145	1.047	1.019	1.049

Note: A coefficient greater than 1 indicates that the industry's return on capital is low, that is, characterized by excess capital investment; a coefficient less than 1 indicates insufficient capital investment.

4. Results and Discussions

4.1 Which industries were supported by the government?

There is an array of studies on the motivation of policy support, often in forms of bank credit and price tilt. The consensus is that state-owned enterprises are more likely to receive policy support and similarly, industries with a higher level of state ownership are more likely to be supported. We use regression models to perform this analysis.

In the selection of the dependent variable, the initial dependent variable is the aforementioned dummy variable based on whether the industry is covered by government documents during the period of the economic stimulus plan. However, the results may be biased because the coverage is not complete, the results obtained may not reflect the situation of the entire industry. In this regard, an alternative method is proposed here based on the input-output relationship between industries. Some industries may not be directly supported by the government, but the output of these industries may be the inputs of supported industries. In this sense, the industry has been indirectly supported. Drawing on China's input-output matrix, we calculate the part of support for one industry reflected in other industries. In this way, we construct two new policy support indicators (see Tables 4 and 5).

Table 4: Policy Support Factors Based on Input-Output Matrix

Industry	Support factor	Support factor-weighted	Support factor-weighted2
	Treatment	Treatment1	Treatment2
Coal mining and coking	0.195	0.480	0.460
Oil and gas extraction	1.610	2.270	1.929
Mining and dressing of ferrous metals	1.124	2.239	0.464
Mining and dressing of nonferrous metal ores	1.134	2.242	0.502
Mining and dressing of non-metallic ores	0.022	0.769	0.100
Other mining and dressing industries	0.000	0.000	0.000
Agricultural and sideline food processing	0.024	0.032	0.056
Food manufacturing	0.008	0.032	0.019
Beverage manufacturing	0.007	0.033	0.016
Tobacco manufacturing	0.005	0.033	0.012
Textile manufacturing	0.011	0.012	0.021
Textile, apparel, shoes and cap Manufacturing	0.032	0.084	0.062
Leather, fur, feather (velvet) and its products	0.021	0.083	0.041
Wood processing and wood, bamboo, rattan, palm and straw manufacturing	0.036	0.296	0.100
Furniture manufacturing	0.000	0.000	0.000
Paper and paper manufacturing	0.040	0.080	0.049
Printing and recording media reproduction	0.008	0.048	0.010
Culture, education, sporting goods manufacturing	0.002	0.010	0.002
Petroleum processing, coking and nuclear fuel processing	1.522	1.659	2.978
Chemical raw materials and chemical products manufacturing	0.237	0.170	0.451
Pharmaceutical manufacturing	0.030	0.094	0.056
Chemical fiber production	0.002	0.012	0.005
Rubber production	0.000	0.001	0.000
Plastic production	0.000	0.000	0.000
Non-metallic mineral manufacturing	0.292	0.984	1.475
Smelting and dressing of ferrous metals	1.878	1.677	5.856
Smelting and dressing of non-ferrous metals	1.298	1.447	2.593
Metal production	1.316	1.548	1.718
General equipment manufacturing	0.284	0.318	0.566
Special equipment manufacturing	0.104	0.202	0.207
Transportation equipment manufacturing	1.556	1.455	3.877
Electrical machinery and equipment manufacturing	1.330	1.381	3.206
Communication equipment, computer and other electronic equipment manufacturing	0.097	0.054	0.211
Instrumentation and culture, office machinery manufacturing	0.073	0.344	0.144
Crafts and other manufacturing	0.029	0.182	0.060
Waste resources and waste materials recycling and processing	1.185	3.746	0.256
Production and supply of electricity and heat	1.944	1.563	4.102
Gas production and supply	0.018	0.177	0.020
Water production and supply	1.047	1.313	0.098

Table 5: Non-Manufacturing Sector Policy Support Factors

Industry	Support factor	Support factor-weighted	Support factor-weighted2
	Treatment	Treatment1	Treatment2
Construction	1.061	1.015	6.368
Transportation and warehousing	1.437	1.311	4.157
Postal services	1.037	1.118	0.082
Information transmission, computer services and software	0.077	0.196	0.196
Wholesale and retail trade	0.237	0.157	0.454
Accommodation and catering	0.095	0.12	0.178
Financial services	0.25	0.238	0.464
Real estate	1.035	1.03	1.522
Leasing and commercial services	0.109	0.138	0.163
Research and experimental development	0.016	0.282	0.039
Comprehensive technology services	0.056	0.291	0.128
Water, environment and public facilities management	0.055	0.06	0.013
Resident and other Services	0.065	0.147	0.129
Education	0.01	0.01	0.014
Health, social security and social welfare	0.015	0.026	0.029
Culture, sports and entertainment	0.027	0.104	0.037
Public management and social organizations	0.002	0.002	0.004

From the statistics above, we can see that the scale of industries supported by policies is generally large, indicating that the asset-heavy industries are obviously more favored. Table 6 presents descriptive statistics of the main variables used in the regression analysis. Since the economic stimulus plan took place at the end of 2008, its policy formulation cycle was much shorter than any previous industry-level policy design. Therefore, this economic stimulus plan was less affected by factors such as tensions between the central and local governments. It is more based on the characteristics of the industry itself, which is helpful for us to study how this tilted expansion policy has to do with the industry itself.

In the choice of independent variables, L_{ta} (logarithm of total assets), L_{fixas} (logarithm of fixed assets), $Faratio$ (ratio of fixed assets to total assets) are used to measure the asset structure of various industries; L_{labor} (logarithm of number of employees), $Edu1$ (average years of education), $Edu2$ (proportion of college students and above) describe the labor structure of each industry; $Socratio$ (proportion of state-owned capital) indicates the degree of state-owned control at the industry level; $Deprate$ (depreciation rate) measures the rate at which investment takes effect in an industry. The higher the depreciation rate, the greater the added value of a unit of investment, controlling for other conditions; ROA (return on assets) signifies industry profitability.

Table 6: Descriptive Statistics of Main Variables (2001-2013)

Variable	Definition	Mean	Standard Deviation
Treatment	Control group = 0; Policy support group = 1	0.350	0.490
Treatment1	Simple support factor based on input-output relationship	0.690	0.650
Treatment2	Weighted support factor based on input-output relationship	0.810	0.900
Lta	Ln (total assets)	8.100	0.090
Lfixas	Ln (fixed assets)	7.040	0.090
Faratio	Percentage of fixed assets	0.363	0.007
Llabor	Ln (number of employees)	4.670	0.080
Socratio	Proportion of state capital	0.148	0.009
Deprate	Depreciation rate	0.081	0.017
ROA	Return on assets, profit before tax/total assets	0.065	0.004
Edu1	Average education level	10.160	0.060
Edu2	Proportion of students above college level	0.141	0.006

Table 7 reports the results of the regression analysis. Model (1) includes total fixed assets. It can be inferred from the results that industries with more fixed assets have a higher probability of receiving credit support. The coefficient of state-owned capital is significantly positive, indicating that industries with a higher proportion of state-owned assets are more likely to be supported by favorable credit policies. The depreciation rate is included in the income that can be brought by a unit of asset investment within a fixed period of time. The larger the value of the variable, the faster the investment is converted into GDP, that is, the shorter the time for the investment to pay off. Its coefficient is also positive though not significant, which is easy to explain in the context of the financial crisis at the end of 2008, because economic output at that time fell rapidly, and a requirement of the economic stimulus plan was to exert an immediate effect. The coefficient of return on assets is positive, suggesting that it is easier for more profitable industries to obtain loans. The coefficient of labor force is negative and statistically significant at the 1% level, which indicates that the policy choice of credit resource allocation did not take into account the employment capacity. The effect of employees' education level is negative but insignificant.

Model (2) replaces total fixed assets with total assets and the proportion of fixed assets. As a result, it is found that the coefficient on total assets is significantly positive and slightly larger than the coefficient on fixed assets in model (1). The fixed assets ratio is positive and significant at the 10% level. This shows that the credit support depends mainly on total assets, and the higher the proportion of fixed assets over total assets, the easier it is to obtain policy support. This is generally consistent with international evidence. Since fixed assets are good collateral, they have become one of the most important considerations for bank credit. Empirical results generally find that firms with a high proportion of fixed assets are more likely to obtain loans. Except for total assets, the coefficients on state-owned assets ratio, depreciation rate and return on assets are basically the same as before. The coefficient on employees' education has changed to a significantly negative level (at the level of 5%), indicating that credit policies are preferentially biased towards low-end labor-intensive industries.

Model (3) uses another measure of education level, that is, the proportion of labors with college education or above as a percentage of total employment. The coefficient of this variable is basically the same as that of the average education level, both of which are negative and significant at the 5% level. The regression results of the first three models show that support

policies do not give priority to high-end labor-intensive industries, but that low-end labor-intensive industries are more likely to receive policy support.

The results in models (4)-(7) offer a robustness test for the results in the first three models. The variables used in models (4) and (5) are simple average policy support factors calculated based on the input-output matrix, and the variables used in models (6) and (7) are weighted averages based on the input-output table where weights are added value for various industries. The coefficients of the industry's total assets, employment, state-owned assets ratio, and average education level are basically the same as before, with only numerical changes. The coefficient of the depreciation rate has increased considerably and is significant at the 1% level, which shows that although the economic stimulus plan did not directly consider depreciation rate, the input-output relationship between industries has led more industries with higher depreciation rates to receive credit support. Since depreciation is included in the added value, GDP will be increased in the short term, but long-term economic growth should exclude the depreciation part, so such policy support is not conducive to long-term economic development.

Corporate profitability, measured by ROA, is another variable with a significant change in coefficient. With the weighted average support factor being the dependent variable, the ROA coefficient turns significantly positive, testifying that hypothesis that the economic stimulus plan indeed took the profitability of various industries as an important consideration. Industries with higher profitability are more likely to be included in policy support group, but this also means that when the industry is in a cyclical decline, the probability of it being considered for policy support is lower. Therefore, industries with a strong cyclical pattern (such as steel and nonferrous metals) are most likely to receive policy support, which is consistent with findings in the existing literature.

Table 7: Industry Characteristics and Policy Support

Variables	Treatment	Treatment	Treatment	Treatment1	Treatment1	Treatment2	Treatment2
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Lta		0.318***	0.351***	0.329***	0.302***	0.461***	0.369***
		(0.069)	(0.070)	(0.088)	(0.090)	(0.118)	(0.122)
Faratio		0.592*	0.613*	0.487	0.483	-0.293	-0.286
		(0.336)	(0.334)	(0.431)	(0.431)	(0.578)	(0.588)
Llabor	-0.267***	-0.302***	-0.340***	-0.234***	-0.211**	-0.466***	-0.395***
	(0.057)	(0.068)	(0.071)	(0.088)	(0.092)	(0.118)	(0.125)
Socratio	0.666**	0.724**	0.769***	1.415***	1.350***	3.147***	2.869***
	(0.263)	(0.293)	(0.288)	(0.376)	(0.372)	(0.504)	(0.506)
Deprate	2.981	2.285	2.157	6.188**	6.015**	10.09***	9.021**
	(1.997)	(2.065)	(2.040)	(2.648)	(2.633)	(3.551)	(3.586)
ROA	0.417	0.450	0.512	1.113	1.088	3.689***	3.641***
	(0.567)	(0.588)	(0.585)	(0.753)	(0.755)	(1.010)	(1.029)
Edu1	-0.077	-0.100**		-0.037		-0.326***	
	(0.048)	(0.051)		(0.065)		(0.088)	
Lfixas	0.279***						
	(0.056)						
Edu2			-1.381**		-0.108		-2.416**
			(0.542)		(0.699)		(0.953)
Constant	0.046	-0.324	-1.251***	-1.707***	-1.935***	0.961	-1.471***
	(0.374)	(0.366)	(0.284)	(0.469)	(0.367)	(0.629)	(0.499)
Observations	228	228	228	228	228	228	228
R-squared	0.226	0.235	0.244	0.315	0.314	0.283	0.259

Note: The brackets are robust standard deviations, * indicates $p < 0.1$, ** indicates $p < 0.05$, *** indicates $p < 0.01$; R2 is an unadjusted value.

4.2 Did government support lead to resource misallocation?

The following table shows the impact of various factors on credit misallocation during different time intervals. These factors were selected from previous research on industry development and resource misallocation. The regression model constructed in this section is as follows:

$$Y = \beta_0 + \beta_1 Treatment + \beta_2 Treatment \times TimeDummy + \beta_3 TimeDummy + \beta_4 Controls + \varepsilon$$

The dependent variable Y represents the relative distortion factor of industry i in year t. The choice of the independent variables is as follows: SOC represents the proportion of state-owned capital; DTA is the overall asset-liability ratio; ROA is the industry-level return on assets; Revg is the growth rate of the industry value-added, symbolizing the development stage of the

industry; IIR is the ratio of corporate interest expenditure to total debt, which measures the financing constraints faced by firms. Entg and Jobg are the logarithm of net change in the number of firms and the number of employees in the industry, respectively, indicating the competition level and employment creation rate of the industry. Generally speaking, the entry and exit of firms and employees should be measured separately, but due to data limitations, only the net change can be observed here. ROA*Treatment is the interaction term of ROA and Treatment or Treatment², corresponding to the independent variable.

The first three models use direct support factor as the independent variable to discuss the impact of direct policy support on credit misallocation during different time periods. The direct support factor is determined jointly by Treatment and ROA*Treatment. In order to avoid possible endogenous problems, the ROA here uses lagged data. It can be seen that from 2001 to 2007, the variable of policy support alone did not aggravate relative capital distortion, but the higher the ROA, the greater the impact of policy support on capital allocation distortion. The coefficient of the interaction term shows that industries with stronger profitability receive more than optimal capital allocation, which indicates that the both the central government and local governments value their follow-up profitability. This over-optimistic investment behavior may be beneficial in the boom period, especially for industries with long capacity construction cycles, but during unexpected recession, it will definitely threaten the survival of supported industries.

As for other variables, the coefficient of the asset-liability ratio (DTA) is significantly negative, and the coefficient of the financing constraint (IIR) is positive but not significant, indicating that industry financing has an important impact on credit misallocation. The former indicates that supported industries with more loans tend to use capital more effectively, whereas the latter shows that the tighter the financing constraints, the more severe the misallocation problem. The coefficient of return on assets (ROA) is significantly negative, suggesting that the profit margin of industries with high profitability is also relatively high. With the same capital stock, the higher the ROA, the smaller the relative capital distortion. It is worth mentioning that the impact of state-owned capital (SOC) during this period is not significant, which shows that from 2001 to 2007, no serious credit misallocation occurred in the state-owned capital-intensive industries. Although there was the controversy of “the state enterprises advance, the private sectors retreat”, in fact, industries with a high proportion of state-owned capital also generated high profits during this period, so as far as return on capital itself, there is no excessive distortion. The coefficient of the net firm entry (Entg) is positive but not significant, indicating that the increase in competition has not distorted credit allocation. During this period, the central government controlled the number of firms in certain industries. Firm access was strictly restricted, and small firms and firms with backward production capacity were required to merge and restructure, which have, to a certain extent, restrained the occurrence of credit misallocation. The coefficient of net labor entry (Jobg) is significantly positive, which means that there is a positive correlation between credit misallocation and labor entry, which is inconsistent with general economic intuition, because the increase of one factor should lead to an increase in the return on other factors, which in turn reduces distortion. We hypothesize that the period from 2001 to 2007 was characterized by large-scale transfer of rural labor surpluses. This batch of labor has flooded into infrastructure construction, while industries related to infrastructure construction received substantial investment and policy support during the same period. The resulting phenomenon is that the relative credit distortions in these supported industries have increased, and the number of employees has increased. However, due to the lack of year-to-year data on the educational level of employees, this cannot be verified here.

Models (2) and (3) are the regression results for 2008-2009 and 2010-2013, respectively. Although there are grave doubts about whether the government still supports these industries

after 2010, this does not prevent this paper from discussing the development differences between the two groups of industries in the subsequent historical periods according to the grouping of the stimulus period. Even though policy support was no longer obvious during the period of 2010-2013, it is still meaningful to study the development of these two groups of industries.

The F-test shows that direct policy support has exacerbated credit misallocation between industries. The coefficient of the direct policy support variable is positive in both periods, but the coefficient of the interaction term is not. The coefficient of the interaction term in the 2008-2009 interval is the same as the previous interval, and is still significantly positive. The coefficient of the interaction term is significantly negative from 2010 to 2013. Generally speaking, the impact of ROA on credit misallocation is positive, because the increase in industry profit means the relative increase in marginal return on capital. Since the coefficient of the interaction term is not the result of the spontaneous market adjustment, it can only be explained by policy intervention. Although the regression here uses lagged ROA, the support itself may be continuous, and the short-term ROA fluctuations of the industry are unlikely to affect continuous policy changes. In this sense, the difference between using contemporary or lagged ROA should not be significant. If future market demand faced by the industry is consistent with expectations, then this support may be beneficial, as it helps the industry to prepare for capacity in advance. But when market demand faces an unexpected decline, especially during the financial crisis period, this advance capacity reserve will have negative effect. Excessive capacity and output will reduce the overall profit margin of the industry, intensifying the problem of credit misallocation. This policy lag has often been referred to as “policy inertia”. It can be said that “policy inertia” is of some benefit during economic prosperity, but increased the negative impact of fluctuations.

The main difference between models (4)-(6) and the first three regressions is that the independent variable uses a weighted policy support factor (Treatment2) calculated based on the input-output matrix. From the comparison with regression results of the first three columns, it can be seen that the impact of the weighted support factor on credit misallocation is the same as the direct support factor, but the magnitude is generally much smaller. Considering industry i which is not supported by the government, and part of its output is the input of industry j . In this case, credit support for industry j will directly increase the output of industry j . At the same time, it indirectly increases the demand for industry i , and thus promotes industry i . Therefore, distortions caused by biased industrial support policies will eventually be partially offset by the input-output links between industries. This distortion reduction caused by the input-output relationship can be seen as an economical “automatic stabilizer”.

With regard to other coefficients, the estimated results obtained using the indirect policy support variables are similar to those obtained by the direct policy support variables, except that the magnitude of the coefficient has been reduced. This shows that the conversion of production and input between industries has smoothed the external shocks. However, differential treatment due to industrial support policies still plays a role in exacerbating capital distortions. That is to say, even considering the “automatic stabilizer” effect ascribable to the input-output relationship between industries, policy support still exacerbated credit misallocation before and during the financial crisis.

Table 8: Factors Affecting Credit Misallocation

Variables	Direct support factor	Indirect Support Factor	Weighted Indirect Support Factor
Treatment(_/1/2)	-0.476**	-0.413***	-0.081
	(0.192)	(0.125)	(0.054)
Tr*D06_07	0.246	0.255	0.055
	(0.253)	(0.183)	(0.084)
Tr* D08_10	0.101	0.279*	0.104
	(0.244)	(0.169)	(0.076)
Tr*D11_13	-0.110	0.165	0.100
	(0.273)	(0.179)	(0.078)
D06_07	0.527***	0.477***	0.498***
	(0.160)	(0.153)	(0.144)
D08_10	0.743***	0.602***	0.563***
	(0.172)	(0.152)	(0.140)
D11_13	1.096***	0.907***	0.787***
	(0.206)	(0.171)	(0.152)
L.DTA	-1.919**	-1.477*	-1.521*
	(0.808)	(0.789)	(0.798)
L.ROA	-17.420***	-14.860***	-13.220***
	(2.569)	(1.751)	(1.651)
SOC	4.021***	4.364***	4.058***
	(0.445)	(0.457)	(0.448)
Revg	-0.101	-0.083	-0.139
	(0.203)	(0.201)	(0.202)
IIR	24.280***	19.810***	20.170***
	(7.675)	(7.380)	(7.425)
Tg	7.758***	5.388***	3.274***
	(2.510)	(1.539)	(1.257)
Entg	0.394**	0.397**	0.419**
	(0.181)	(0.179)	(0.181)
Jobg	0.097	0.096	0.084
	(0.174)	(0.173)	(0.175)
Constant	2.145***	1.867***	1.797***
	(0.544)	(0.519)	(0.523)
Observations	421	421	421
R-squared	0.499	0.504	0.493

Note: The brackets are robust standard deviations, * indicates $p < 0.1$, ** indicates $p < 0.05$, *** indicates $p < 0.01$; R2 is the adjusted value.

4.3 Did government support lead to a decline in returns?

The following table shows the correlation between return on assets and policy support. The result of the simple regression in model (1) shows that the direct policy support throughout the observation period 2001-2013 did not have a negative impact on the ROA of various industries. With the 2001-2005 interval as the benchmark period, the impact of policy support on firm performance has gradually turned negative in subsequent time intervals. It can be seen from the coefficients of the interaction terms that during 2006-2007, the impact of policy support on ROA was 1.38% lower than in 2001-2005; in 2008-2010, this impact was 3.42% lower, but were not significant in these two periods. The impact of policy support from 2011 to 2013 was significantly negative, lowered by 5.81%.

Models (3) and (5) use the policy support factor after considering the input-output relationship. In this case, the overall impact of policy support on profitability has turned nonsignificant. The coefficient of the interaction term is similar to model (1).

Due to the possible correlation of financial indicators in some industries over the same period, columns (2), (4), and (6) introduce lags in some variables (total industry assets, proportion of state-owned capital). Some basic results. For other variables, this article also considers the lag term, which is limited in space, and the results are not reported here.

Table 9: ROA and Policy Support

Variables	ROA (1)	ROA (2)	ROA (3)	ROA (4)	ROA (5)	ROA (6)
Treatment	0.018*** (0.006)	0.016*** (0.006)				
Treatment1			0.019*** (0.004)	0.017*** (0.004)		
Treatment2					0.001 (0.001)	0.001 (0.001)
D06_07	0.049*** (0.009)	0.051*** (0.009)	0.048*** (0.009)	0.051*** (0.009)	0.046*** (0.009)	0.048*** (0.009)
D08_10	0.082*** (0.008)	0.084*** (0.008)	0.080*** (0.008)	0.083*** (0.008)	0.079*** (0.008)	0.0817*** (0.008)
D11_13	0.127*** (0.012)	0.129*** (0.012)	0.125*** (0.012)	0.127*** (0.011)	0.121*** (0.012)	0.124*** (0.011)
Tr*D06_07	-0.014 (0.021)	-0.021 (0.021)	-0.014 (0.021)	-0.022 (0.022)	-0.006 (0.021)	-0.012 (0.021)
Tr*D08_10	-0.034 (0.021)	-0.040* (0.022)	-0.035 (0.021)	-0.041* (0.022)	-0.025 (0.020)	-0.029 (0.022)
Tr*D11_13	-0.058*** (0.016)	-0.061*** (0.018)	-0.059*** (0.017)	-0.063*** (0.018)	-0.048*** (0.015)	-0.050*** (0.017)
Capinten	0.022*** (0.003)	0.021*** (0.003)	0.022*** (0.003)	0.021*** (0.003)	0.021*** (0.003)	0.021*** (0.003)
Lta	-0.037*** (0.006)		-0.038*** (0.006)		-0.034*** (0.006)	
L.Lta		-0.036*** (0.007)		-0.037*** (0.007)		-0.034*** (0.007)

Faratio	0.142***	0.144***	0.136***	0.138***	0.143***	0.146***
	(0.048)	(0.050)	(0.047)	(0.049)	(0.049)	(0.051)
Llabor	0.036***	0.034***	0.036***	0.034***	0.032***	0.032***
	(0.007)	(0.009)	(0.007)	(0.008)	(0.006)	(0.008)
Socratio	-0.032		-0.052**		-0.020	
	(0.023)		(0.024)		(0.023)	
L.Socratio		-0.011		-0.026		-0.004
		(0.022)		(0.022)		(0.022)
Deprate	0.536**	0.611***	0.408*	0.503**	0.588**	0.641***
	(0.227)	(0.222)	(0.227)	(0.219)	(0.237)	(0.229)
Entg	0.013	0.003	0.013	0.003	0.013	0.004
	(0.009)	(0.008)	(0.009)	(0.008)	(0.010)	(0.008)
Jobg	-0.001	-0.009	-0.002	-0.011	0.000	-0.008
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
Constant	0.040	0.027	0.066*	0.050	0.032	0.024
	(0.039)	(0.038)	(0.039)	(0.038)	(0.042)	(0.040)
Observations	421	420	421	420	421	420
R-squared	0.549	0.548	0.561	0.557	0.533	0.535

Note: The brackets are robust standard deviations, * indicates $p < 0.1$, ** indicates $p < 0.05$, and *** indicates $p < 0.01$.

5. Endogenous Problems

The problem with OLS is that policy support is endogenous to the distortion factor and ROA. Industries with higher ROA are more likely to be supported because the government can share more benefits from their development. But here, reverse causality is not the main source of endogeneity. If policy support changes due to changes in the industry's ROA, then reverse causality will lead to endogenous issues, but the policy support considered in this paper is continuous and does not change with changes in the short-term industry ROA, so the problem of reverse causality does not hold.

This is not to say that endogenous problems do not exist, because there are still unobservable factors that affect both government support and industry profitability. Previous literature discussed that the role of industry development in national security, the difference in the absorption of rural labor surpluses during large-scale labor migration, and the promotion incentive of local government officials will affect support policies as well as industry profitability. These issues need to be considered, and we need to find appropriate instrumental variables to address the endogeneity problem.

This paper uses three instrumental variables. The first is the ratio of lagged value added of an industry over the value added of the same industry in the United States during the same period. According to the theory of the protecting naive industries, the greater the difference between the value added of an industry in relation to the United States, the stronger the country's motivation to support this industry, so as to ensure that the development of the industry in the home country can gradually catch up with the level of the United States. The value-added ratio of the lagging period is unlikely to affect the ROA of the industry in China in the next period. This is because the external factors affecting the ROA of the industry should have the same effect on a global scale, so the difference between the two is hardly affected by these factors. Technically, China's industry classifications are not exactly the same as those of the United States. This paper has made adjustments by matching similar industries.

The second instrumental variable is the average education level of employees in various industries. Considering the migration and employment of rural labor surpluses in the past two decades, the policy is likely to support some industries that are helpful to the employment of surplus labor, such as those related to infrastructure construction. Meanwhile, the average level of education is unlikely to affect the production function of this industry, especially after controlling for capital intensity.

The third instrumental variable is the upstream degree of each industry in the supply chain (see Ju and Yu, 2015). In the outlines of the five-year plans, the industries that are related to the lifeline of the national economy are considered as the industries that need to be controlled by the government. The so-called lifeline of the national economy means, to a certain extent, upstream industries in the supply chain. Therefore, the more upstream the industry, the more likely it is to be supported by the government. At the same time, the upstream degree itself only measures the position of the industry in the supply chain, and the upstream and downstream relations are unlikely to directly affect the profitability of the industry.

Table 10 shows the regression results of the first stage of the two-step instrumental variable method. It can be seen that the correlation between the level of education and policy support is significantly negative, and the impact of industrial output gap on support is not significant, but after considering the input-output relationship, the impact of the gap is significantly positive. The correlation between upstream degree and support factor is also significantly positive.

Table 10: Correlation Between Instrumental Variables and Policy Support Factors

Variables	Treatment	Treatment	Treatment1	Treatment1	Treatment2	Treatment2
	(1)	(2)	(3)	(4)	(5)	(6)
Edu1	-0.155***		-0.145***		-0.202***	
	(0.027)		(0.034)		(0.075)	
Edu2		-1.854***		-1.300***		-1.640*
		(0.295)		(0.376)		(0.835)
Vaygap	0.054	0.060	0.133**	0.129**	0.265*	0.253*
	(0.040)	(0.041)	(0.055)	(0.056)	(0.140)	(0.142)
Upstream	0.034**	0.027*	0.006	-0.003	0.215***	0.203***
	(0.016)	(0.015)	(0.024)	(0.024)	(0.066)	(0.065)
Capinten	-0.062***	-0.059***	-0.081***	-0.080***	-0.148***	-0.146***
	(0.013)	(0.013)	(0.018)	(0.018)	(0.032)	(0.032)
Lta	0.378***	0.395***	0.492***	0.481***	0.822***	0.796***
	(0.030)	(0.031)	(0.042)	(0.044)	(0.099)	(0.101)
Faratio	0.308	0.356	0.489	0.525*	1.416**	1.461**
	(0.244)	(0.239)	(0.301)	(0.297)	(0.605)	(0.607)
Llabor	-0.405***	-0.428***	-0.447***	-0.439***	-0.608***	-0.585***
	(0.035)	(0.037)	(0.046)	(0.050)	(0.101)	(0.106)
Socratio	1.681***	1.712***	2.387***	2.285***	2.775***	2.582***
	(0.293)	(0.288)	(0.375)	(0.368)	(0.677)	(0.667)
Deprate	7.193***	7.136***	11.84***	11.56***	18.29***	17.81***
	(1.415)	(1.443)	(1.916)	(1.964)	(4.415)	(4.431)
Entg	-0.0112	-0.00832	-0.00362	0.00327	-0.0341	-0.0229
	(0.048)	(0.049)	(0.057)	(0.058)	(0.148)	(0.150)
Jobg	0.111	0.123*	0.172**	0.178**	0.126	0.131
	(0.070)	(0.070)	(0.083)	(0.082)	(0.222)	(0.216)
Constant	-0.281	-1.642***	-1.506***	-2.698***	-4.124***	-5.750***
	(0.310)	(0.202)	(0.376)	(0.286)	(0.791)	(0.751)
Observations	421	421	421	421	421	421
R-squared	0.356	0.364	0.456	0.450	0.426	0.423

Note: The brackets are robust standard deviations, * indicates $p < 0.1$, ** indicates $p < 0.05$, *** indicates $p < 0.01$; R2 is the adjusted value.

Table 11 shows the regression results of the factors affecting resource misallocation using the instrumental variable method. It can be seen that policy support has significantly increased the relative distortion factor of the industry.

Table 11: Factors Affecting Credit Misallocation-Instrumental Variable Method

Variables	Distortion Factor	Distortion Factor	Distortion Factor
	(1)	(2)	(3)
Treatment	1.580***		
	(0.293)		
Tr*D06_07	-0.687		
	(0.439)		
Tr*D08_10	-0.585		
	(0.393)		
Tr*D11_13	-0.999**		
	(0.428)		
Treatment1		0.904***	
		(0.194)	
Tr*D06_07		-0.327	
		(0.289)	
Tr*D08_10		-0.218	
		(0.263)	
Tr*d 11_13		-0.404	
		(0.300)	
Treatment2			0.165*
			(0.093)
Tr*D06_07			-0.086
			(0.136)
Tr*D08_10			-0.028
			(0.128)
Tr*D11_13			-0.115
			(0.143)
D06_07	0.413**	0.391**	0.330*
	(0.198)	(0.191)	(0.172)
D08_10	0.423**	0.424**	0.338**
	(0.176)	(0.169)	(0.162)
D11_13	0.683***	0.641***	0.624***
	(0.223)	(0.211)	(0.197)
L.DTA	-3.010***	-3.413***	-4.347***
	(0.773)	(0.771)	(0.779)
L.ROA	-14.830***	-15.620***	-18.340***
	(1.673)	(1.669)	(1.594)
SOC	8.46e-05*	5.12e-05	0.000***
	(4.39e-05)	(5.11e-05)	(4.95e-05)
Revg	-0.429**	-0.308	-0.226
	(0.214)	(0.215)	(0.218)
IIR	21.910***	29.890***	24.890***
	(7.653)	(8.101)	(8.155)

Tg	4.100***	4.541***	6.729***
	(1.274)	(1.273)	(1.186)
Entg	0.483**	0.444**	0.431**
	(0.188)	(0.190)	(0.195)
Jobg	0.0109	-0.035	0.005
	(0.179)	(0.182)	(0.187)
Constant	2.861***	3.036***	3.995***
	(0.502)	(0.504)	(0.477)
Observations	421	421	421
R-squared	0.465	0.453	0.422

Note: The brackets are robust standard deviations, * indicates $p < 0.1$, ** indicates $p < 0.05$, *** indicates $p < 0.01$; R2 is the adjusted value.

Table 12 shows the results of new results of ROA and policy support using these three instrumental variables. Comparing with the previous results, we can find that the government offered direct support during the entire observation interval (2001-2013) and has not improved the ROA of supported industries. The coefficient of the interaction term indicates that the impact of policy support on ROA is not constant, but there is a process of gradually turning negative. The period of 2011-2013 is the period when policy support has the greatest negative impact on ROA. After considering the input-output relationship, the negative impact of policy support on ROA has become greater.

Table 12: ROA and Policy Support-Instrumental Variable Method

Variables	ROA	ROA	ROA
	(1)	(2)	(3)
Treatment	-0.027		
	(0.019)		
Treatment1		-0.007	
		(0.018)	
Treatment2			-0.013**
			(0.006)
D06_07	0.042***	0.040***	0.040***
	(0.009)	(0.010)	(0.010)
D08_10	0.075***	0.075***	0.071***
	(0.007)	(0.008)	(0.008)
D11_13	0.119***	0.116***	0.111***
	(0.011)	(0.012)	(0.012)
Tr*D06_07	0.004	0.007	-0.001
	(0.024)	(0.021)	(0.009)
Tr*D08_10	-0.0155	-0.009	-0.007
	(0.022)	(0.0166)	(0.007)
Tr*D11_13	-0.038**	-0.027**	-0.017***
	(0.016)	(0.013)	(0.006)
Capinten	0.019***	0.021***	0.019***
	(0.003)	(0.003)	(0.003)
Lta	-0.028***	-0.033***	-0.021***
	(0.006)	(0.009)	(0.007)
Faratio	0.154***	0.145***	0.177***
	(0.052)	(0.053)	(0.053)
Llabor	0.026***	0.033***	0.027***
	(0.006)	(0.008)	(0.006)
Socratio	0.005	-0.007	-0.007
	(0.031)	(0.036)	(0.025)
Deprate	0.754**	0.648*	0.891***
	(0.295)	(0.359)	(0.270)
Entg	0.014	0.014	0.013
	(0.010)	(0.010)	(0.009)
Jobg	0.002	0.002	0.001
	(0.008)	(0.008)	(0.007)
Constant	0.001	0.019	-0.071
	(0.050)	(0.071)	(0.059)
Observations	421	421	421
R-squared	0.535	0.532	0.542

Note: The brackets are robust standard deviations, * indicates $p < 0.1$, ** indicates $p < 0.05$, *** indicates $p < 0.01$; R2 is the adjusted value.

Since there are three instrumental variables, a test needs to be performed to check the overfitting issue of instrumental variables. The chi-square statistic value of the Sargan test is 1.58 and the p-value is 0.21; the chi-square statistic value of the Basman test is 1.56 and the p-value is 0.21. Neither test can reject the null hypothesis that there is no overfitting.

In addition, we also need to test for weak instrument variables. This paper uses two approaches: first, the value given by Shea's partial R-square test is 0.09, but since the current econometric research has not provided the accepted critical value about this test, we can only judge this by experience. Second, the minimal statistic given by Wald's test is 20.6, which exceeds the 10% critical level of 19.9, so we can conclude that we reject the null hypothesis of weak instrumental variables at the 10% significance level.

6. Conclusion

The interaction between the financial crisis and policy support has exacerbated resource misallocation. Empirical analysis shows that the increasingly serious distortion of resource misallocation in supported industries is not only a natural manifestation of the economic cycle, but also the consequence of government intervention. Policy support has significantly increased the distortion of supported industries since 2008. The 2008 economic stimulus plan increased short-term demand in supported industries. The performance of these industries did not decrease significantly during 2008 and 2010, but their ROA declined significantly after 2011.

Resource misallocation came not only from direct policy support, but also from indirect support. The government's long-term propensity for infrastructure investment has increased the demand for supported industries. After considering the input-output relationship, the negative impact of policy support on ROA has become greater.

Despite the controversy, China's "4 trillion yuan" economic stimulus package can be improved in many areas. Although we are unlikely to witness another financial crisis of the size of 2008 in three to five years, it is still meaningful to analyze the policy response at that time. Because the effects of economic policies in major events are often more pronounced, it is easier to analyze and evaluate gains and losses. Local or small-scale crises may still occur in the future, and formulating sound economic policies is conducive to effectively coping with these crises.

References

- [1] Zoellick, Robert B., and Justin Yifu Lin, Recovery: A Job for China and the U.S., The Washington Post, 2009.
- [2] Bai, Chong-En, and Qiong Zhang, Analysis of China's return on capital and its influencing factors, The Journal of World Economy, 2014, (10): 3-30.
- [3] Hsieh C.T., and Klenow P.J., Misallocation and manufacturing TFP in China and India, Social Science Electronic Publishing, 2009, 124 (4):1403-1448.
- [4] Restuccia D., and Rogerson R., Misallocation and productivity, Review of Economic Dynamics, 2013, 16 (1):1-10.
- [5] Moll B., Productivity losses from financial frictions: can self-financing undo capital misallocation? The American Economic Review, 2014, 104(10): 3186-3221.
- [6] Banerjee A., Cole S., and Duflo E., Bank financing in India. India's and China's Recent Experience with Reform and Growth. Palgrave Macmillan U.K., 2005.
- [7] Buera F.J., Kaboski J.P., Shin Y., Finance and development: A tale of two sectors. The American Economic Review, 2011: 1964-2002.
- [8] Midrigan V., and Xu D.Y., Finance and misallocation: Evidence from Plant-Level Data, The American Economic Review, 2014, 104(2): 422-458.
- [9] Pavcnik N., Trade liberalization, exit, and productivity improvements: Evidence from Chilean plants, The Review of Economic Studies, 2002, 69(1): 245-276.
- [10] Alcalá B. F., and Ciccone A., Trade and productivity, Quarterly Journal of Economics, 2004, 119(4):613-646.
- [11] Hopenhayn H., and Rogerson R., Job turnover and policy evaluation: A general equilibrium analysis, Journal of Political Economy, 1993: 915-938.
- [12] Lagos R., A model of TFP, The Review of Economic Studies, 2006, 73(4): 983-1007.
- [13] Guner N., Ventura G., and Xu Y., Macroeconomic implications of size-dependent policies, Review of Economic Dynamics, 2008, 11(6138):721-744.
- [14] The State Council of the People's Republic of China, State Council Executive Meeting, 2008.
- [15] Ju J., and Yu X., Productivity, profitability, production and export structures along the value chain in China, Journal of Comparative Economics, 2015, 43(1):33-54.